WE CLAIM:

1. A spin valve device comprising:

A ferromagnetic free layer whose magnetization changes in a magnetic signal field;

A ferromagnetic pinned layer whose magnetization remains unchanged in the magnetic signal field;

A single or a plurality of carbon nanotubes reside between the ferromagnetic free layer and pinned layer, and are in electrical contact with the two. The nanotubes each having a substantially cylindrical wall, having a submicron diameter and a length measured in a direction perpendicular to the diameter, the length being greater than the diameter;

The plane of the ferromagnetic pinned layer is parallel to the plane of the free layer;

The carbon nanotubes are vertically aligned and perpendicular to the planes of the pinned and the free layers;

During the device operation, an electrical current passes from one ferromagnetic layer to the other via the carbon nanotubes.

2. The spin valve device of claim 1, wherein the carbon nanotubes are single wall nanotubes.

3. The spin valve device of claim 1, wherein the ferromagnetic free layer is made of alloys selected from the group containing Ni, Fe, Co.

4. The spin valve device of claim 1, wherein the spin valve device is a magnetic recording read head.

5. The magnetic recording read head of claim 4, wherein

The ferromagnetic free layer is between two soft magnetic shields;

The ferromagnetic pinned layer is not between the two soft magnetic shields;

A single or a plurality of vertically aligned carbon nanotubes reside between the free layer and the pinned layer, extend through the thickness of one of the shields;

6. The magnetic recording read head of claim 4, wherein the spin valve fabrication processes comprising:

Growth of carbon nanotubes on patterned free layer by chemical vapor deposition;

Deposition of an insulation layer;

Deposition of soft magnetic shield layer;

Chemical mechanical polishing of the shield layer and exposing the top of carbon nanotubes;

Deposition and patterning of ferromagnetic pinned layer.

7. The spin valve device of claim 1, wherein the spin valve is included in a magnetic random access memory (MRAM) cell.

8. The MRAM cell of claim 7, wherein the spin valve fabrication processes comprising:

Growth of carbon nanotubes on patterned free layer by chemical vapor deposition;

Deposition of an insulation layer;

Chemical mechanical polishing of the shield layer and exposing the top of carbon nanotubes;

Deposition and patterning of ferromagnetic pinned layer.

9. A spin valve device comprising:

A ferromagnetic free layer whose magnetization changes in a magnetic signal field;

A ferromagnetic pinned layer whose magnetization remains unchanged in the magnetic signal field;

A single or a plurality of carbon nanotubes reside between the ferromagnetic free layer and pinned layer, and are in electrical contact with the two. The nanotubes each having a substantially cylindrical wall, having a submicron diameter and a length measured in a direction perpendicular to the diameter, the length being greater than the diameter;

The ferromagnetic pinned layer resides substantially in the same plane of the free layer;

The carbon nanotubes are in-plane aligned and are substantially in the same plane of the pinned and the free layers.

During the device operation, an electrical current passes from one ferromagnetic layer to the other via the carbon nanotubes.

10. The spin valve device of claim 9, wherein the carbon nanotubes are single wall nanotubes.

11. The spin valve device of claim 9, wherein the ferromagnetic free layer and pinned layer are made of alloys selected from the group containing Ni, Fe, Co.

12. The spin valve device of claim 9, wherein the spin valve device is a magnetic recording read head.

13. The magnetic recording read head of claim 12, wherein

The ferromagnetic free layer is exposed to the air bearing surface, and resides between two soft magnetic shields;

The ferromagnetic pinned layer is recessed from the air bearing surface, and does not overlap the free layer;

A single or a plurality of in-plane aligned carbon nanotubes reside between the free layer and the pinned layer, and are aligned in a direction substantially perpendicular to the air bearing surface;

14. The magnetic recording read head of claim 12, wherein the spin valve fabrication processes comprising:

Patterning of a ferromagnetic free layer and a ferromagnetic pinned layer;

Growth of in plane aligned carbon nanotubes between the free layer and the pinned layer by chemical vapor deposition;

15. The magnetic recording read head of claim 12, wherein the spin valve fabrication processes comprising:

Patterning of a ferromagnetic free layer and a ferromagnetic pinned layer;

Assembling of carbon nanotubes between the free layer and pinned layer.

16. The spin valve device of claim 9, wherein the spin valve is included in a magnetic random access memory (MRAM) cell.

17. The MRAM cell of claim 16, wherein the spin valve fabrication processes comprising:

Growth of carbon nanotubes on patterned free layer by chemical vapor deposition;

Deposition of an insulation layer;

Chemical mechanical polishing of the shield layer and exposing the top of carbon nanotubes;

Deposition and patterning of ferromagnetic pinned layer.

18. The MRAM cell of claim 16, wherein the spin valve fabrication processes comprising:

Patterning of a ferromagnetic free layer and a ferromagnetic pinned layer;

Assembling of carbon nanotubes between the free layer and pinned layer.